CLAIMS

We Claim:

1. A line-set comprising:

a length of tube; and

a micro-electromechanical system (MEMS) element connected to the tube.

2. The line-set of claim 1 further comprising a controller operably connected to the MEMS element.

3. The line-set of claim 1 wherein the MEMS element is a flow sensor.

4. The line-set of claim 1 wherein the MEMS element is a flow valve.

5. The line-set of claim 1 wherein the MEMS element is a pressure sensor.

6. The line-set of claim 2 wherein the controller is detachable from the MEMS element.

7. The line-set of claim 2 wherein the controller has a means for storing information.

8. The line-set of claim 2 wherein the controller has a means for displaying information.

9. The line-set of claim 2 wherein the controller has a means for network communication.

10. The line-set of claim 9 wherein the network communication further comprises means for automated control and interrogation of the MEMS element.

11. A disposable line-set comprising:

a disposable length of tube; and

a disposable MEMS element connected to the tube.

12. The line-set of claim 11 further comprising a reusable controller operably connected to the MEMS element.

13. The line-set of claim 11 further comprising a power source operably connected to the MEMS element.

14. The line-set of claim 13 wherein the power source is disposable.

15. A medical line-set comprising:

a length of tube; and

a MEMS pump element attached to the tube.

16. A medical line-set comprising:

a length of tube having a first end adapted to be connected to a container and a second end adapted to be connected to another component, the tube having a MEMS element attached thereon.

17. The line-set of claim 16 further comprising a power source operably connected to the MEMS element.

18. The line-set of claim 16 further comprising a MEMS element controller operably connected to the MEMS element.

19. An infusion system comprising:

a length of tube having a first end adapted to be connected to a container and a second end adapted to be connected to a body, the tube having a MEMS element attached thereon.

20. The infusion system of claim 19 wherein the MEMS element is a flow sensor.

21. The infusion system of claim 19 wherein the MEMS element is a flow valve.

22. The infusion system of claim 19 wherein the MEMS element is a pressure sensor.

23. The infusion system of claim 19 wherein the MEMS element is a pump.

24. An infusion system comprising:

a length of tube having a first end adapted to be connected to a container and a second end adapted to be connected to a body, the tube having a MEMS element attached thereon, the MEMS element being controllable by a wireless controller.

25. The infusion system of claim 24 further comprising a power source operably connected to the MEMS element.

26. The infusion system of claim 24 wherein the controller has a means for network communication.

27. The infusion system of claim 24 wherein the tube and MEMS element are disposable.

28. The infusion system of claim 25 wherein the power source is disposable.

29. The infusion system of claim 24 wherein the MEMS element is remotely controllable by the wireless controller.

30. A medical line-set comprising:

a length of tube;

a MEMS pump element attached to the tube; and

a power source connected to the MEMS element.

31. The line-set of claim 30 wherein the power source is detachable from the MEMS element.

32. A medical line-set comprising:

a length of tube; and

a MEMS element adapted to be attached to the tube, the line-set capable of being implanted inside a body.

33. The medical line-set of claim 32 further comprising an implantable power source operably connected to the MEMS element.

34. The line-set of claim 32 further comprising a reusable, wireless MEMS element controller operably connected to the MEMS element.

35. A disposable medical infusion and draw line-set comprising:

a disposable tube;

a disposable electromechanical pump element connected to the tube;

a reusable pump controller operably connectable to the pump element; and

a disposable reservoir operably attached to the tube.

36. The system of claim 35 wherein the disposable reservoir has at least one valve.

37. The system of claim 36 wherein the valve is controlled remotely.

38. The system of claim 35 wherein the pump element is volumetric.

39. The system of claim 35 wherein the pump element is ambulatory.

40. The system of claim 35 wherein the pump element is wearable.

41. The system of claim 35 wherein the pump element is portable.

42. The system of claim 35 wherein the pump element includes a slide clamp.

43. A medical line-set comprising:

a tube having a first end adapted to be connected to a container and a second end adapted to be connected to another component;

a MEMS pump attached to the tube and configured to pump fluid from the container through the tube; and

a power source attached to the tubing and operably connected to the MEMS pump.

44. The medical line-set of claim 43 wherein the MEMS pump and the power source are contained within the tube.

45. A method for delivering a medication from a container to a patient, the method comprising the steps of:

providing tubing having a MEMS pump attached thereto, the MEMS pump being operably connected to a power supply, the tubing having a first end adapted to be in communication with the container and a second end adapted to be in communication with the patient; and

activating the power supply to power the pump wherein the medication is pumped by the MEMS pump from the container to the patient.

46. The method of claim 45 further comprising the step of controlling the MEMS pump with an external controller.

47. The method of claim 45 further comprising the step of discarding the tubing and MEMS pump after use.

48. A method of delivering fluid from a container comprising the steps of:

providing tubing having a MEMS pump attached thereto, the tubing having a first end adapted to be in communication with the container and a second end;

providing a controller having a power supply;

operably connecting the controller to the MEMS pump;

activating the controller to provide power to the MEMS pump; and

pumping fluid from the container and through the tubing.

49. The method of claim 48 wherein the controller controls the MEMS pump to deliver fluid at a predetermined rate.

50. The method of claim 48 wherein the controller is connected to the MEMS pump is operably connected to the controller by a wired connection.

51. The method of claim 48 wherein the controller is connected to the MEMS pump is operably connected to the controller by a wireless connection.

52. The method of claim 48 further comprising the step of providing a flow sensor that is attached to the tubing.

53. The method of claim 48 further comprising the step of providing a valve that is attached to the tubing.

54. The method of claim 48 further comprising the step of calibrating the MEMS pump with the controller.

55. The method of claim 48 further comprising the step of discarding the tube and MEMS

pump after use.

56. A method of delivering a medication to a patient comprising the steps of:

providing an infusion system having a tubing having a MEMS pump connected thereto, the MEMS pump having a power supply, the tubing having a first end attached to a container containing a medication and a second end;

implanting the infusion system within the patient wherein the second end of the tube is positioned at a desired location;

providing a controller outside of the patient;

activating the controller to activate the MEMS pump; and

pumping fluid from the container and through the second end of the tube wherein the medication is adapted to be delivered to the desired location.

57. A system for infusion comprising:

a length of tube;

a MEMS element connected to the tube; and

means for controlling the MEMS element.

58. The system of claim 57 further comprising means for storing and displaying infusion data.

59. The system of claim 57 further comprising means for network communication.

60. The line set of claim 57 wherein the means for controlling the MEMS element is wireless.

61. The line set of claim 57 further comprising means for operably attaching a disposable power source to the MEMS element.

62. A medical line-set comprising:

a length of tube having a first and second end;

the tube having an attached MEMS element;
means for connecting the first end of the tube to a container; and
means for controlling fluid flow through the tube with the MEMS element.

63. The medical line-set of claim 62 wherein the MEMS element comprises a means for pumping.

64. The medical line-set of claim 62 further comprising means for sensing pressure.

65. The medical line-set of claim 62 further comprising means for sensing flow.

66. The medical line-set of claim 62 wherein the MEMS element comprises a flow valve.

67. The medical line-set of claim 62 wherein the MEMS element comprises means for supplying power.

68. The medical line-set of claim 62 further comprising means for implanting the line-set inside a body.

69. The medical line-set of claim 62 further comprising means for controlling the MEMS element with a wireless remote controller.

70. A medical line-set comprising:
a length of tube;
a MEMS element adapted to be attached to the tube, and
means for implanting the line-set inside a body.

71. A disposable medical infusion and draw line-set comprising:
a disposable tube;
a disposable micro-electromechanical pump element connected to the tube;

means for operably connecting a reusable pump controller to the pump element; and means for operably attaching a disposable reservoir to the tube.

72. The system of claim 71 wherein the disposable reservoir has at least one valve.

73. The system of claim 72 wherein the valve is controlled remotely.